EXHIBIT 1

EXHIBIT A

EXPERT REPORT OF DR. ANDREW A. BEVERIDGE

I. Summary of Conclusions

1. Latinos constitute a substantial proportion of the total population and citizen voting age population ("CVAP") in the Town of Islip ("Islip" or "the Town"). According to the 2017 one-year American Community Survey, which is the most current data available, Islip's total population is 34.5% Latino and Islip's CVAP is 25.9% Latino.

2. Islip's Latino population is geographically concentrated in the northwest portion of the Town, in or around the hamlets (Census Designated Places) of Brentwood, North Bay Shore, and Central Islip.

3. Based on my analysis of Islip demographics, Latino citizens of voting age are sufficiently numerous and geographically compact to create one majority-Latino CVAP district in a four-district plan that is drawn in accordance with traditional districting principles.

II. Credentials

4. I am a Professor of Sociology at Queens College and the Graduate Center of the City University of New York, and served as Chair of the Queens College Sociology Department from 2006 to 2018. My primary responsibilities at Queens College and the Graduate Center are teaching statistics and research methods at the graduate and undergraduate levels, and conducting quantitative, statistically-based social research. I have a Ph.D. in Sociology and B.A. in Economics from Yale University, and I have been a professor since 1973, first at Columbia University until 1981, and then at Queens College and the Graduate Center of the City University of New York since then.

5. My areas of expertise include demography and the statistical and quantitative analysis of social science datasets, most particularly including Census data, survey data, and administrative records. I am an expert in the application of Geographical Information Systems

("GIS") technology to the analysis of social patterns. I regularly publish results and analyses in professional journals and peer-reviewed books. Some of my analyses have served as the basis for articles in *The New York Times*, where I have served as a demographic consultant since 1993, through an agreement between Social Explorer Inc. and *The New York Times*.

6. I am the co-founder and CEO of Social Explorer Inc., a website that provides demographic and other social data in a visual form. The site and related projects have won six awards and had over one million users in the last year. The site is distributed to libraries by Oxford University Press, and is licensed to Pearson Publishing across all of higher education for the development of curricular materials. I have also served as a consultant to a number of public and private entities, where I provide services related to demographic analysis.

7. I have been involved in districting and redistricting since the 1992 round, where I crafted the plan for the Yonkers City Council that was put into place under court supervision. Working for the City of Yonkers, I drew the council districts for two different decades based upon data from the 1990 and 2000 Census. In 2011, I was retained by Westchester County to prepare a redistricting plan following the 2010 Census for the Westchester County Legislature. That same year, I was also retained by the City of New Rochelle to prepare a redistricting plan for the New Rochelle City Council following the 2010 Census. Both maps were put into place. The maps I prepared for Westchester County and the City of New Rochelle were based upon data from the 2010 Census and American Community Survey.

8. I have provided expert opinions and testimony regarding proposed districting plans in several districting cases, including *Goosby* v. *Town Board of Hempstead*, No. 88-cv-2453 (E.D.N.Y. 1997), and *United States* v. *Port Chester*, No. 7:06-cv-15173 (S.D.N.Y. 2010). I have participated in other cases, including two cases where I presented a state-wide redistricting

plan for New York, as well as cases related to districting for Suffolk County, New York; Bridgeport, Connecticut; New Rochelle, New York; and Nassau County, New York. In each of these cases and engagements, I have used what are generally referred to as traditional districting principles to craft the plans presented. Based on my extensive experience in drawing districting plans, I have a deep understanding of the application of traditional districting principles, and have duly applied them throughout the course of my analysis in this report.

9. I have also provided expert opinions and testimony in demographic and statistical analysis outside of the districting context in a number of cases, including but not limited to: *Winfield* v. *City of New York*, No. 1:15-cv-5236 (S.D.N.Y.) (Declaration, 2017–present); *Westchester Residential Opportunities, Inc.* v. *Clinton Terrace L.P.*, No. 7:16-cv-9273 (S.D.N.Y.) (Report, 2017); *Akagi* v. *Turin Housing Development Fund, Co.*, No. 1:13-cv-5258 (S.D.N.Y.) (Report, Deposition, Rebuttal Report, 2016–present); *Aref* v. *Sessions*, No. 1:10-cv-539 (D.D.C.) (Report, Deposition, 2013–present); *New York* v. *Evans Bancorp, Inc.*, No. 1:14-cv-726 (W.D.N.Y.) (Report, 2014–2015); *United States* v. *City of New Orleans*, No. 2:12-cv-1924 (E.D. La.) (Report, Deposition, 2013–2014); *City of Joliet* v. *Mid-City Nat'l Bank of Chicago*, No. 1:05-cv-6746 (N.D. Ill.) (Report, Deposition, Trial Testimony, 2012–2013); *United States* v. *St. Bernard Parish*, No. 2:12-cv-321 (E.D. La.) (Report, 2013–2014); *Favors* v. *Cuomo*, No. 1:11-cv-5632 (E.D.N.Y.) (Hearing Testimony, 2012); *Rivera* v. *Incorporated Village of Farmingdale*, No. 2:06-cv-2613 (E.D.N.Y.) (Report, Deposition, 2009–2014); *Aguilar* v. *Immigration and Customs Enforcement Div. of the U.S. Dept. of Homeland Security*, No. 1:07-cv-8224 (S.D.N.Y.) (Report, Rebuttal Report, Deposition, 2010–2013). A virtually complete list of cases and other matters in which I have provided opinions, as well as a list of publications, are listed in my curriculum vitae, attached as Exhibit 1.

III. Scope of Assignment

10. I have been retained by counsel for Plaintiffs in *Flores* v. *Town of Islip*, to analyze the population in Islip and the possibility of drawing a four-district plan for Islip, in accordance with traditional districting principles, in which Latinos[1] would form a majority of the CVAP in one district.

11. Such a district would be drawn by following traditional districting principles, including contiguity, population equality, compactness, and preserving political and geographic subdivisions.

12. I am being paid $225 per hour plus expenses for my analysis and testimony.

IV. Underlying Data, Maps, and Software Relied Upon

13. I used three main types of materials to conduct the analysis set out in this report:

a. **Census data and maps.** I have relied upon materials obtained from the U.S. Census Bureau, including demographic data from 1980 to 2018, as well as various map and boundary files.

b. **Election Districts ("EDs") and election results.** I have relied upon materials obtained from the Suffolk County Board of Elections and Suffolk County Division of Geographic Information Services, including election district maps and data on election results from 2002 to 2017.

c. **Data processing software.** I have relied on three types of software – Microsoft Excel, SAS, and Maptitude for Redistricting – in order to process these data and conduct the analysis contained in this report.

[1] The American Community Survey Questionnaire defines "Hispanic, Latino, or Spanish Origin" as one category. I use "Latino" to refer to those of this category.

14. The history, significance, and utility of each of these materials is discussed in more detail below as a foundation for the methodologies I have applied to reach my conclusions.

A. Evolution of Census Survey Methods and Data Releases

15. The primary demographic data used throughout my analysis is derived from the U.S. Census Bureau. The Census is mandated by the U.S. Constitution and was initially developed to apportion Congressional Representatives among the states. In modern times, use of data from the Census Bureau is ubiquitous in creating districts for virtually all legislative bodies in the United States that are elected through a district-based structure. Below, I describe historical changes regarding the form and frequency of surveys conducted by the Census Bureau, as well as data collected from those surveys.

16. **Decennial Census.** The decennial Census is conducted each decade, with surveys distributed to every household in the United States. From 1940 through 2000, the decennial Census included two forms of surveys: (1) a short-form, with a brief set of basic questions; and (2) a long-form, which included additional, more detailed questions in addition to the basic set contained in the short-form. The short-form survey collects basic data on the total population, such as the number of individuals living in a household as well as the age and sex of those individuals, whereas the long-form survey collects more detailed demographic data, such as social, economic, and immigration status, and nativity. In 2000, the last year the decennial Census included a long-form survey, approximately one-sixth of households received the long-form survey, while the remaining households received the short-form. Thus, the decennial Census captured a fully comprehensive nationwide dataset regarding the short-form questions, while also collecting data on the additional long-form questions by sampling a substantial proportion of households.

17. **American Community Survey ("ACS").** Beginning in the late 1990s, the Census Bureau began developing a survey program to collect and release long-form data on a more frequent basis, which was launched in 2005 as the American Community Survey.[2] Thus, the decennial Census long-form survey was discontinued after the implementation of the ACS. The 2010 decennial Census included only the short-form survey distributed to all households. The more detailed data from the old long-form Census is now collected through the ACS by using a "rolling sample" method, rather than a once-per-decade sample as a component of the decennial Census. The ACS collects data continually through monthly surveys based on random selection, with no address being selected more than once every five years. Approximately 95% of selected households respond. Survey responses are then aggregated on a yearly basis and released as an annual data set, *i.e.*, one-year ACS files. One-year ACS files are released for geographic areas larger than 65,000, and rules are in place to filter data if estimates are not obtained reliably. The ACS also compiles and releases five-year ACS files each year by aggregating survey responses for all 60 months within the preceding five-year period. The total aggregate sample size for the five-year ACS approaches that of the long-form decennial Census. As explained below, five-year ACS files include data for geographies down to the Block Group level, and replaces the data releases that were previously available only once per decade from the long-form Census. The U.S. Census Bureau also releases special files every year through its Redistricting Data Program, which are based on the five-year ACS files but tabulate and array data for ease of use in drawing districting maps.

[2] A description of the ACS program is available on the U.S. Census Bureau's website, https://www.census.gov/programs-surveys/acs.html.

B. Census Geography

18. Census geography is very well defined. The Census Bureau delineates geographic units at various levels of granularity according to various visible and non-visible features, certain pre-existing boundaries of legal significance, and in some cases pre-existing boundaries that have no legal significance but are generally recognized by the local population. Some but not all types of Census geographic units are delineated according to population requirements. The Census Bureau releases data files that are broken down according to certain statistical geographic areas. The particular geographic areas included in a file depend on the underlying dataset and the population of the geographic area at issue. Below is an explanation of each geographic unit and the geographic breakdown made available in different types of files.

i. Census Geographic Units

19. Census maps and boundary files[3] delineate certain areas of geographic significance at various levels of granularity, including, as applicable to my analysis, the Town of Islip, incorporated Villages, unincorporated Census Designated Places ("CDPs"), Census Tracts, Block Groups, and Census Blocks.[4]

20. The **Census Block** is the smallest geographic unit delineated by the Census Bureau. As its name suggests, the typical Census Block is a small, enclosed area bounded by streets or other visible features on all sides.[5] There are more than 11 million Census Blocks in the United States which, collectively, cover the entire U.S. territory. Census Blocks are not

[3] Census data, maps and boundaries are publicly available for download from the Census website, www.census.gov. The earlier data are available for download from the National Archive (www.nara.gov) and many other sources such as depository libraries.

[4] For a fuller explanation of Census geographic designations, see Standard Hierarchy of Census Geographic Entities, U.S. Census Bureau (Oct. 2010), https://www2.census.gov/geo/pdfs/reference/geodiagram.pdf.

[5] In some cases, Census Blocks are delineated by visible features such as streams and railroad tracks, or nonvisible features such as property lines or the boundaries of a county, city, town, or school district.

delineated based on population; in fact, about 5.5 million of them have no residents at all. Census Blocks serve as the foundation for creating the larger Census geographic units.

21. **Block Groups and Tracts** are created by combining Census Blocks into larger units which are based upon population. Block Groups have a total population in the range of 600 to 3,000. Census Tracts generally have a population in the range of 1,200 to 8,000, with an average of about 4,000. Block Groups are statistical subdivisions of Tracts, and contain clusters of Census Blocks within the same Tract. There are about 75,000 Tracts in the United States and about 235,000 Block Groups.

22. **Census Designated Places ("CDPs")** are geographic areas defined by the Census Bureau to provide data for settled concentrations of population that are identifiable by name, but not legally incorporated.[6] CDPs are the statistical counterpart of incorporated Villages, although CDPs do not perform local government functions. Unlike Tracts and Block Groups, CDPs are not delineated based on population requirements. Their boundaries are typically defined in cooperation with local officials in order to reflect commonly understood geographic distinctions among the local population. For example, Brentwood, North Bay Shore, and Central Islip are each delineated CDPs. CDPs are often colloquially referred to as hamlets.

23. **Public Use Microdata Areas ("PUMAs")** are special non-overlapping areas that partition a state. Each PUMA contains a population of about 100,000. PUMAs are geographic areas that are assembled from a collection of Census Tracts and are drawn by state governments at the time of each decennial Census. PUMAs were initially developed to make it possible to

[6] CDP boundaries may change from one decennial Census to the next with changes in the settlement pattern; a CDP with the same name as in an earlier census does not necessarily have the same boundary. As described later in this report, the boundaries of CDPs within Islip – especially Brentwood, North Bay Shore, and Central Islip – have changed only slightly over the past decades.

analyze Public Use Microdata Sample ("PUMS") data with geographic specificity. Since the advent of ACS, PUMAs have also been one of the areas for which tabulated or aggregated data are supplied.

ii. Census Bureau File Types and Geographic Breakdowns

24. Decennial Census data is released down to the Census Block level for short-form data, and was released down to the Block Group level for long-form data until the long-form survey was supplanted by the ACS in 2005. The short-form decennial Census is the only file type that provides analysis at the Census Block level, which is made possible by its fully comprehensive sample size – *i.e.*, virtually every household.

25. Five-year ACS files include data down to the Block Group level, which is very similar to files previously compiled from the long-form decennial Census. Five-year ACS data provide a sufficiently large sample size for reliable analysis within Block Groups and more populous geographic units, but not within individual Census Blocks.

26. One-year ACS files provide data for geographic areas that have a total population of at least 65,000.[7] Thus, one-year ACS data are not available for Census Blocks, Block Groups, or Tracts. Data for specific CDPs, incorporated Villages, and municipalities are made available only where such geographic areas meet the population threshold. Although one-year ACS files are based on a relatively smaller sample size, the underlying data is appropriate for statistically meaningful analysis of more populous geographic areas.

27. The one-year and five-year ACS files are based on data collected from the same underlying survey process, but each type offers certain advantages depending on the desired

[7] The ACS previously released three-year ACS data sets for areas with a population of at least 20,000, but discontinued these releases in 2014.

analysis. One-year ACS files include data collected during only the most recent year, and are therefore the most current ACS data offered by the Census Bureau. However, these files do not provide data at the same level of geographical granularity as the five-year ACS. As of my drafting of this report, the most recent one-year ACS file available is from 2017.

28. Five-year ACS files, on the other hand, include demographic data down to the Block Group level. However, because the five-year ACS includes data collected over the previous 60 months, these files may not fully reflect the most recent trends. Five-year ACS files are thus considered to be "centered" around the midpoint of the date range – for example, the most recent available five-year ACS file is for 2013–2017, which is centered on 2015.[8]

29. The Census Bureau also releases special redistricting files every year through its Redistricting Data Program.[9] These special redistricting files are based on the five-year ACS, but array data in a very useful way to enable map drawing. Special redistricting files include data regarding citizenship and racial and ethnic classifications at a variety of geographic levels, most particularly at the Block Group and Tract levels.[10]

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[8] The American Community Survey, like all surveys, is subject to sampling error. Here, since the size of the resulting districts is well over 80,000, the sample size is approximately 9,000. Since the sample is complex, and there are a variety of methods to approach margins of error, the precision of the sample is hard to state precisely. However, considering an estimate of 54% of a given group in a district, and assuming the design effect decreases the effective sample size to 4,000, the margin of error of the estimate at a 99% confidence level would be less than 2%. This means that estimates of the percent of Latino CVAP in Islip are quite precise.

[9] These files are made available by the U.S. Census Bureau. More information regarding data offered through the Census Redistricting Program is available on the Census website, https://www.census.gov/programs-surveys/decennial-census/data/datasets/rdo.html.

[10] Unlike the special tabulations from the Census Redistricting Program, the data released in the one-year and five-year ACS files include data for Latino, non-Latino white, and an "other race" category, but do not include data for non-Latino black or other racial groups. In the special redistricting file, "other" is eliminated and those answering "other" are folded into other categories based upon an algorithm that considers their answers to other questions on the ACS. The vast bulk of individuals tabulated as "other race" report that they are Latino. If respondents report that they are "other race," their responses to other questions on the ACS are used to put them into a likely racial category. Accordingly, on the redistricting tabulation, they are added to one of the valid racial categories.

30. Thus, I have carefully considered the tradeoffs involved in determining which file type is most appropriate for certain steps of my analysis. Short-form decennial Census data are useful, but provide limited detail in terms of demographic characteristics. Furthermore, data from the 2010 census is now nine years old and is therefore of limited utility in drawing conclusions about present circumstances. ACS files include more demographic detail and are much more current than the 2010 decennial Census. One-year ACS files are advantageous for analysis of the most current demographics and recent trends in geographic areas with larger populations. However, five-year ACS files enable analysis at a level of geographic granularity that is not possible using one-year ACS files.

31. Use of ACS data for demographic and districting analysis is generally accepted practice. Indeed, the American Community Survey is considered the "gold standard" among demographic surveys, and is used for a wide variety of academic, commercial, and other purposes. There have been a series of conferences, including a conference with peer reviewed presentations organized by the Committee on National Statistics of the National Academy of Sciences, detailing the various uses of the ACS, which include, among other things, redistricting.[11]

32. To analyze demographic comparisons over time, I used data from the 1980, 1990, and 2000 short-form and long-form decennial Census, the 2010 short-form decennial Census, and the one-year and five-year ACS files from 2006 through 2017.

[11] *See* National Academy of Sciences, Committee on National Statistics, *Benefits, Burdens, and Prospects of the American Community Survey: Summary of a Workshop* (2013). I contributed to this workshop. The ACS Users Group has held a series of conferences, some of which have featured me as a presenter, which are described at: https://acsdatacommunity.prb.org/p/conferences.

33. For my analysis of current demographics in Islip and smaller geographic areas within Islip, I used the most current ACS data that comparably reports information for the particular geographic area at issue, which may be one-year or five-year ACS files depending on the population of the area. For information most relevant to district map drawing, I have used the Census Bureau's special redistricting files based on the 2013–2017 five-year ACS. These files were released on February 22, 2019.

iii. Maps and Boundary Files

34. In 1990, the Census Bureau began to digitize many of its maps (including those from 1980) using Geographical Information Systems ("GIS"). Using these maps in conjunction with commonly available GIS software, it became much easier to produce maps depicting a wide array of social characteristics.

35. For my analysis in this report, I used Census boundary files from 1980 forward. I obtained files for 1980 through 2000 from the Minnesota Population Center's National Historic Geographic Information System project, an ongoing project funded by the both the National Science Foundation and National Institutes of Health. For years 2010 and later, I used files from the Census Bureau.[12]

36. I also used data from the Suffolk County Board of Elections ("BOE") for the results of all elections from 2002 through 2018, broken down by ED. In addition, I used Suffolk County map files, which delineate the current boundaries of EDs in Islip. The most recent ED maps were drawn in 2012 and have remained constant through the present day.[13]

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[12] These files are available for download from the Census website, https://www.census.gov/geo/maps-data/data/tiger.html?#.

[13] These materials are maintained by the GIS Division of the Suffolk County Department of Information Technology.

C. Map-Drawing Tools

37. In analyzing the various datasets described above, I utilized: Microsoft Excel software; SAS, a well-known software program used to run statistical analyses and organize data; and Maptitude for Redistricting, the leading GIS software used for creating district maps.[14]

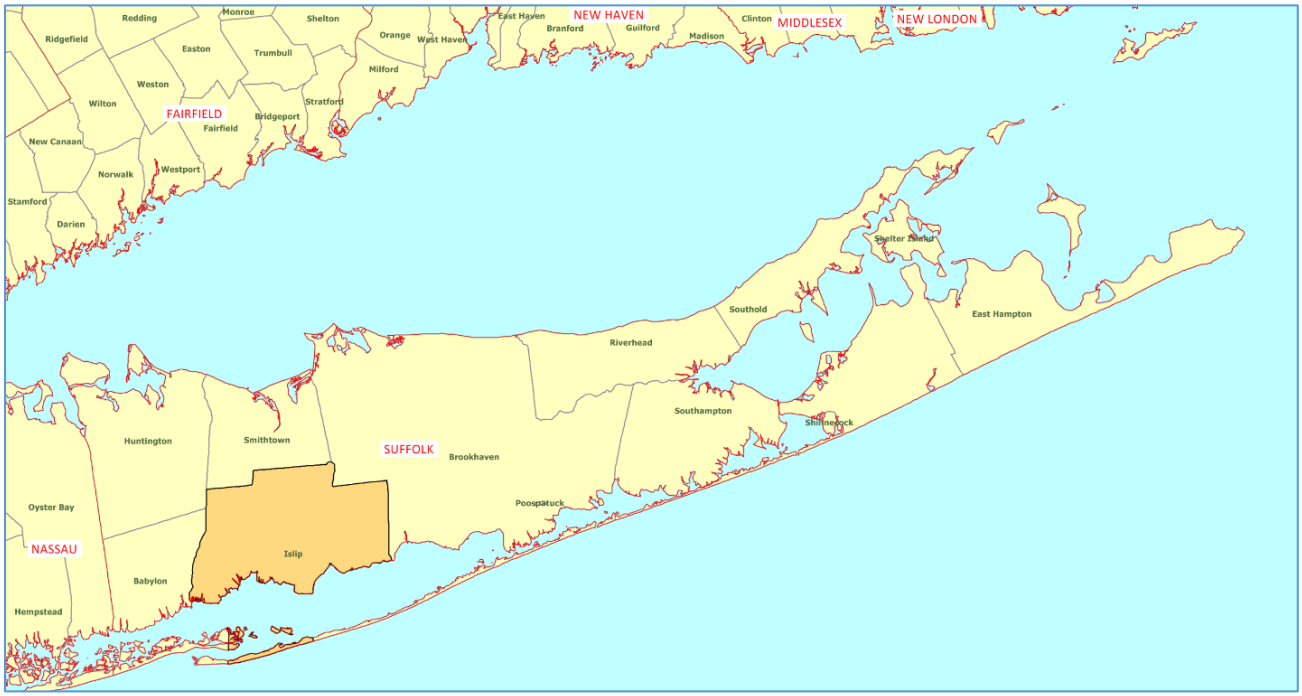
38. In the districting context, a GIS package makes it possible to combine boundary files (such as the ones from the Census Bureau and Suffolk County) with data for particular geographic areas, such as Census Blocks or EDs. GIS software provides tools that make it possible to create redistricting plans based upon these data. It displays the boundaries of areas such as villages or CDPs, as well as roads, highways and other physical boundaries. It is also possible to highlight population concentrations using thematic mapping features, which shade particular geographic regions based on the percentage of a given group within that region. Reporting tools assist the map drawer in tracking district populations, contiguity of districts, splits of geographic areas, and compactness of resulting districts (including the provisional plan districts) using well-known peer reviewed measures. In short, GIS software such as Maptitude makes it possible to rigorously follow the traditional districting principles of contiguity, population equality, compactness, respect for political and physical boundaries, and preservation of communities of interest. Software such as Maptitude makes is much easier and more efficient to follow traditional districting principles, and report the results of doing so.

V. Background

39. The Town of Islip is located in the southwestern portion of Suffolk County. It is adjacent to Babylon to the West, Huntington to the West and North, Smithtown to the North, and Brookhaven to the East. Islip's location is shown in Map 1, below.

[14] For an overview of Maptitude software, see https://www.caliper.com/mtredist.htm.

Map 1. Location of Islip Town in Suffolk County, New York.
(Based Upon Census Boundary Files, 2017.)



40. The Town of Islip encompasses four incorporated Villages and all or part of 23 CDPs. The four Villages – Ocean Beach, Saltaire, Bright Waters, and Islandia – perform some local governmental functions. Of the 23 CDPs in Islip, five include areas that extend outside of the boundaries of the Town – Hauppauge, Holbrook, Holtsville, Fire Island, and Oak Beach-Captree. The boundaries of these Villages and CDPs are shown in Map 2, below.

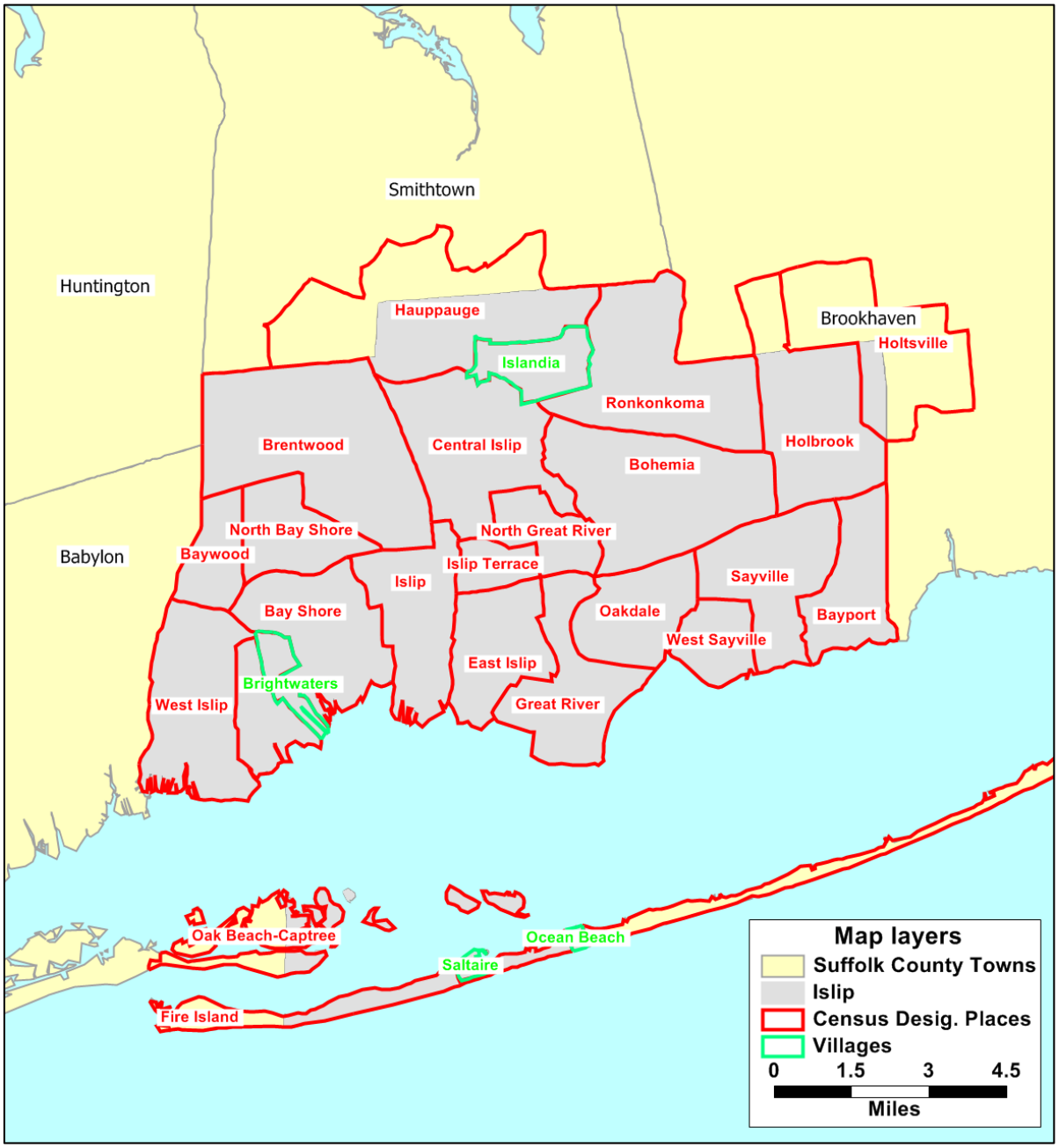
41. Hauppauge, Holbrook, and Holtsville include significant populations both within and outside of Islip;[15] Fire Island has a total population of only 246;[16] and Oak Beach-Captree

[15] According to the 2013–2017 five-year ACS, Hauppauge had a total population of 19,852 of whom 9,508 (47.9%) reside in Islip; Holbrook had a total population of 26,117 of whom 21,322 (81.6%) reside in Islip; and Holtsville had a total population of 20,201 of whom 3,052 (15.1%) reside in Islip. Throughout my analysis, I am only considering the portions of the CDPs that are in the Town of Islip.

[16] According to the 2013–2017 five-year ACS, 96 (39.0%) of Fire Island CDP's residents live in Islip.

has no population within Islip.[17] Exhibit 2 provides detailed information from the 2013–2017 five-year ACS regarding the population and demographics of these Villages and CDPs.

Map 2. Map of Villages and Census Designated Places In or Partially In Islip. (Based Upon Census Boundary Files, 2017.)



[17] Oak Beach-Captree is therefore excluded from further discussion.

42. Although most of the CDPs in Islip have not been incorporated, they have largely remained consistent for many years. Included in Exhibit 3 is the most recent Federal Register Notice regarding CDPs, along with information regarding the various CDPs now designated for Islip. In addition, maps depicting the CDPs boundaries over time are included. It is readily apparent that the CDP boundaries of Brentwood, North Bay Shore, and Central Islip have changed very little from 1980 to 2010.[18]

43. According to Michael Ratcliffe, Assistant Division Chief of Geographic Standards, Criteria, Research, and Quality, for the Geography Division of the Census Bureau, the standards for delineating CDPs are directly related to the following from the Register notice appended in Exhibit 3.

> The CDP name should be one that is recognized and used in daily communication by the residents of the community. Because unincorporated communities generally lack legally defined boundaries, a commonly used community name and the geographic extent of its use by local residents is often the best identifier of the extent of a place, the assumption being that if residents associate with a particular name and use it to identify the place in which they live, then the CDP's boundaries can be mapped based on the use of the name. There should be features in the landscape that use the name, such that a non-resident would have a general sense of the location or extent of the community; for example, signs indicating when one is entering the community; highway exit signs that use the name; or businesses, schools, or other buildings that make use of the name.

44. From this discussion it is plain that the CDPs in Islip represent well defined areas, and that the changes in the CDPs in recent decades have been quite minor, especially when it comes to those of much size or importance. This is especially true of Brentwood, North Bay Shore, and Central Islip. However, CDPs are unincorporated and do not perform any local government functions.

[18] Islandia Village was separated from Central Islip and an unincorporated area was added to Central Islip.

45. The Town Board of Islip is the primary local governmental entity for the vast bulk of the population in the Town. It currently includes the Town Supervisor (the presiding officer) and four Councilmembers, all of whom are elected to four-year terms. Councilmembers' terms are staggered, such that two of the four seats are up for election every two years. Elections occur every other year in odd years. Each elected official is elected at-large by all voters within the Town. The next election for Islip's Town Board is in November of 2019 – two Town Council seats are up for election, but the Town Supervisor's current term continues until 2021.

VI. Islip's Population and Demographics

A. Population and Demographic Trends in the Town of Islip

46. In this section, I analyze trends in Islip's current population and demographics, as well as historical changes dating back through 1980. I have provided analysis based on both five-year ACS files and one-year ACS files, as well as information from decennial censuses where appropriate. While five-year ACS data are helpful in demonstrating trends over time, it should be noted that they do not fully reflect the most current circumstances or the most recent trends because the five-year ACS, by definition, must include older data spanning a five-year period. Thus, I have also relied on data from one-year ACS files to analyze the current circumstances and most recent trends in Islip's demographics, where possible.

47. According to the 2017 one-year ACS, Islip Town had a population of 333,701. According to the 2013–2017 five-year ACS, which is centered around 2015, Islip had a total population of 335,302 (1,801 greater than in the 2017 one-year ACS).

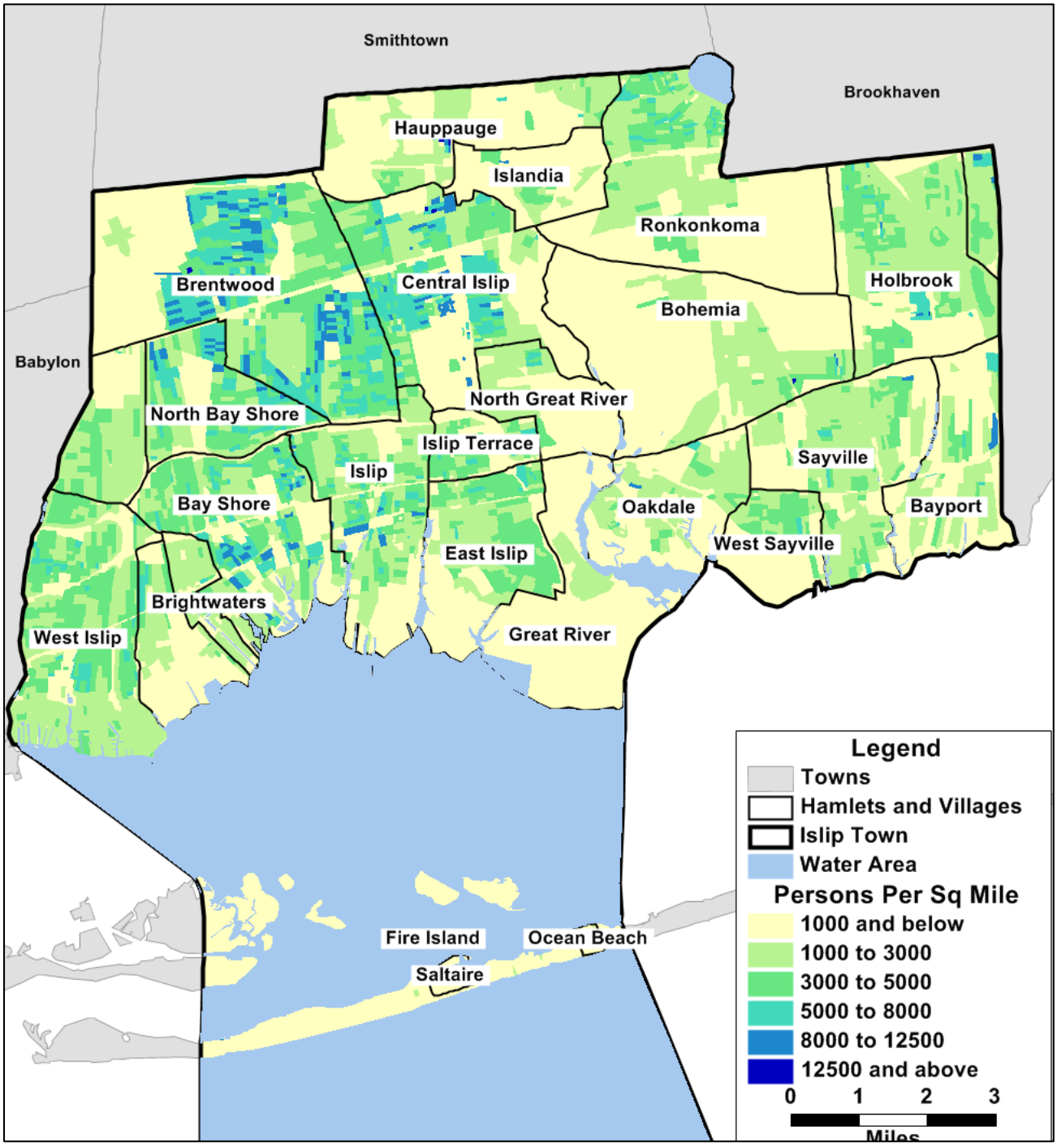
48. According to the 2017 one-year ACS, which is based upon the most recent ACS data available, Islip's CVAP is 25.9% Latino and its total population is 34.5% Latino. According to the 2013–2017 five-year ACS, Islip's CVAP is 20.4% Latino and its total population is 30.8% Latino.

49. Map 3 shows the population density throughout Islip based on the 2013–2017 five-year ACS.

50. Table 1 presents the basic population trends in Islip through a comparison of information from the 2005–2009 and 2013–2017 ACS redistricting files, which center on 2007 and 2015, respectively.[19] Table 1 shows a marked increase in the proportion of Latino CVAP in Islip from 15% to 20.4% across these periods. However, as noted above, the Latino CVAP is 25.9% of Islip's total CVAP according to the 2017 one-year ACS.

[19] As explained above, the 2013–2017 ACS special redistricting file is the most current available file. The 2005–2009 redistricting file was the first such file ever released because the ACS began collecting data in 2005.

Map 3. Population Distribution in the Town of Islip and its CDPs and Villages.



Source: Block data from 2010 Census and Census Boundaries and Features.

Table 1. Racial and Latino Composition of the Town of Islip, 2005–2009 and 2013–2017.

Population Category	ACS 2005–2009		ACS 2013–2017	
Citizens of Voting Age	**218,645**	**100.00%**	**221,830**	**100.00%**
Non-Latino White	160,100	73.22%	146,975	66.26%
Latino	32,785	14.99%	45,340	20.44%
Non-Latino Black	20,430	9.34%	22,795	10.28%
Non-Latino Asian	4,350	1.99%	5,535	2.50%
Non-Latino All Other	980	0.45%	1,185	0.53%
Citizens	**303,515**	**100.00%**	**297,870**	**100.00%**
Non-Latino White	207,290	68.30%	185,120	62.15%
Latino	57,520	18.95%	72,665	24.39%
Non-Latino Black	30,575	10.07%	30,380	10.20%
Non-Latino Asian	6,650	2.19%	7,880	2.65%
Non-Latino All Other	1,480	0.49%	1,825	0.61%
Citizens Under 18	**84,870**	**100.00%**	**76040**	**100.00%**
Non-Latino White	47,190	55.60%	38,145	50.16%
Latino	24,735	29.14%	27,325	35.94%
Non-Latino Black	10,145	11.95%	7,585	9.98%
Non-Latino Asian	2,300	2.71%	2,345	3.08%
Non-Latino All Other	500	0.59%	640	0.84%
Total Population	**336,755**	**100.00%**	**335,310**	**100.00%**
Non-Latino White	210,795	62.60%	187,230	55.84%
Latino	81,635	24.24%	103,245	30.79%
Non-Latino Black	33,355	9.90%	33,020	9.85%
Non-Latino Asian	9,490	2.82%	9,930	2.96%
Non-Latino All Other	1,480	0.44%	1,885	0.56%

Source: ACS Special Redistricting Files, 2005–2009 and 2013–2017

51. Table 1 shows the relative breakdown of Islip's CVAP and non-voting age citizen population, *i.e.* citizens under 18 years old. When one compares the 2005–2009 five-year ACS with the 2013–2017 five-year ACS, the Latino CVAP proportion in Islip has increased as these younger Latino citizens reach voting age and the number of Latinos in Islip increases. In fact, Islip's Latino CVAP has continued to increase since the 2013–2017 five-year ACS (which is centered on 2015), because Islip's total Latino CVAP was 25.9% according to the 2017 one-year ACS. Because the proportion of Latino non-voting age citizens in Islip (about 36%) is greater

than the Latino CVAP proportion (about 20%) according to the 2013–2017 five-year ACS, even without any migration of Latinos into Islip, the proportion of Latino CVAP will continue to grow. In addition, the non-Latino white population and CVAP have steadily declined in Islip, thus further increasing Latino proportions. Given these trends, it is reasonable to expect that Islip's Latino CVAP proportion has continued to increase since the 2013–2017 five-year ACS and the 2017 one-year ACS, and will continue to do so.

52. Table 2 shows the relative increases in the Latino population, CVAP, and non-voting age citizen population from the 2012–2016 to the 2013–2017 five-year ACS files, which are centered on 2014 and 2015, respectively. It is clear that Latino proportions in all categories continue to increase. Indeed, the proportional Latino CVAP increased from almost 19% to almost 20.4% between the two most recent five-year ACS files.

Table 2. Racial and Latino Composition of the Town of Islip, 2012–2016 and 2013–2017.

Population Category	ACS 2012–2016		ACS 2013–2017	
Citizens of Voting Age	**220,280**	**100.00%**	**221,830**	**100.00%**
Non-Latino White	148,920	67.60%	146,975	66.26%
Latino	41,595	18.88%	45,340	20.44%
Non-Latino Black	23,160	10.51%	22,795	10.28%
Non-Latino Asian	5,475	2.49%	5,535	2.50%
Non-Latino All Other	1,130	0.51%	1185	0.53%
Citizens	**297,645**	**100.00%**	**297,870**	**100.00%**
Non-Latino White	187,540	63.01%	185,120	62.15%
Latino	68,805	23.12%	72,665	24.39%
Non-Latino Black	31,585	10.61%	30,380	10.20%
Non-Latino Asian	7,960	2.67%	7,880	2.65%
Non-Latino All Other	1,755	0.59%	1,825	0.61%
Citizens Under 18	**77,365**	**100.00%**	**76,040**	**100.00%**
Non-Latino White	38,620	49.92%	38,145	50.16%
Latino	27,210	35.17%	27,325	35.94%
Non-Latino Black	8,425	10.89%	7,585	9.98%
Non-Latino Asian	2,485	3.21%	2,345	3.08%
Non-Latino All Other	625	0.81%	640	0.84%
Total Population	**335,720**	**100.00%**	**335,310**	**100.00%**
Non-Latino White	189,590	56.47%	187,230	55.84%
Latino	99,740	29.71%	103,245	30.79%
Non-Latino Black	34,430	10.26%	33,020	9.85%
Non-Latino Asian	10,095	3.01%	9,930	2.96%
Non-Latino All Other	1,865	0.56%	1,885	0.56%

Source: ACS Special Redistricting Files, 2012–2016 and 2013–2017

53. The composition of Islip has been changing for several decades, and there is an increasing number of Latino, black, and other residents, and a lower proportion who are non-Latino white. Many of them are of voting age, and many are citizens. Table 3 shows the changing racial composition of the total population of Islip from 1980 through 2017 based on data from one-year ACS files, as well as decennial Census data for years that predate the ACS launch in 2005. The underlying Table is attached as Exhibit 4.

Table 3. Changing Racial Composition of Islip's Total Population

Survey	Non-Latino White	Non-Latino Black	Non-Latino Asian	Latino
1980 Census	85.14%	5.05%	0.74%	**8.79%**
Total population: 298,897	254,479	15,099	2,207	26,256
1990 Census Long-Form	79.14%	6.03%	1.50%	**13.06%**
Total population: 299,587	237,100	18,062	4,508	39,135
2000 Census Long-Form	67.47%	8.48%	1.19%	**20.20%**
Total population: 322,625	217,690	27,370	3,835	65,160
2006 One-Year ACS	62.76%	9.06%	2.50%	**23.88%**
Total population: 326,506	204,906	29,581	8,151	77,957
2010 One-Year ACS	55.58%	8.62%	3.10%	**30.67%**
Total population: 335,796	186,651	28,956	10,415	102,979
2016 One-Year ACS	52.91%	8.43%	3.21%	**33.98%**
Total population: 333,743	176,581	28,130	10,709	113,398
2017 One-Year ACS	52.23%	8.56%	2.42%	**34.53%**
Total population: 333,701	174,303	28,558	8,077	115,233

54. Tables 4 and 5 present the changing racial composition of Islip's VAP and CVAP, respectively. From these data, it is plain that Islip has continued to change and evolve.

Table 4. Race and Latino Composition of Islip's VAP Since 2000.

Survey	Non-Latino White	Non-Latino Black	Non-Latino Asian	Latino
2000 Census Long-Form	69.97%	7.65%	2.01%	**18.68%**
Total VAP: 234,490	164,070	17,930	4,715	43,810
2006 One-Year ACS	64.93%	8.69%	2.85%	**22.56%**
Total VAP: 244,102	158,484	21,217	6,945	55,058
2010 One-Year ACS	57.93%	9.33%	3.20%	**28.41%**
Total VAP: 251,068	145,453	23,431	8,028	71,327
2016 One-Year ACS	55.62%	8.92%	3.37%	**31.28%**
Total VAP: 257,296	143,118	22,956	8,675	80,482
2017 One-Year ACS	54.53%	10.81%	2.72%	**32.51%**
Total VAP: 257,121	140,215	27,789	6,999	83,584

Table 5. Race and Latino Composition of Islip's CVAP Since 2000.

Survey	Non-Latino White	Non-Latino Black	Non-Latino Asian	Latino
2000 Census Long-Form	76.87%	7.56%	1.30%	**12.85%**
Total CVAP: 209,860	161,310	15,870	2,720	26,965
2006 One-Year ACS	72.64%	9.01%	1.67%	**15.61%**
Total CVAP: 214,476	155,799	19,319	3,587	33,479
2010 One-Year ACS	67.36%	9.49%	2.90%	**19.15%**
Total CVAP: 212,533	143,153	20,166	6,155	40,699
2016 One-Year ACS	63.88%	9.69%	2.54%	**22.95%**
Total CVAP: 221,395	141,429	21,457	5,623	50,806
2017 One-Year ACS	60.75%	10.97%	2.38%	**25.91%**
Total CVAP: 228,156	138,613	25,033	5,437	59,124

55. As shown by Tables 1–5, there is currently a substantial Latino total population, VAP, and CVAP in Islip. Moreover, these populations have steadily increased over time in both absolute and relative proportional terms. The Latino CVAP in Islip was 25.9% of the total CVAP according to the 2017 one-year ACS, which is the most current ACS data available.

B. Geographic Distribution of Islip's Population

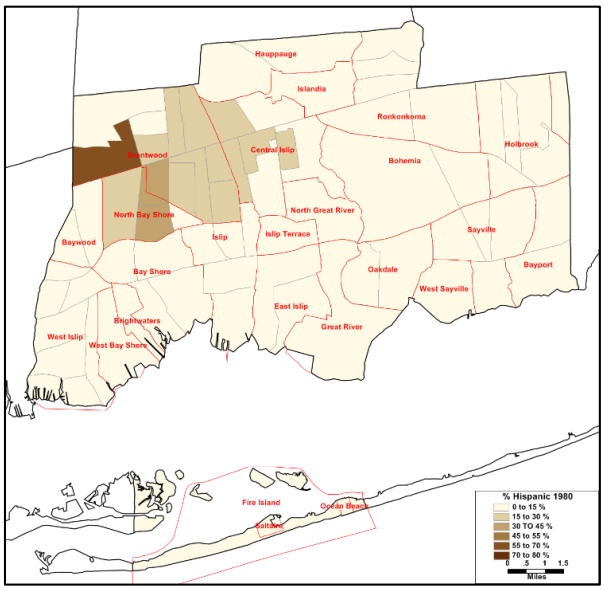
i. Increases in Islip's Latino Population by Geographic Area over Time

56. The increasing proportion of the Latino population in Islip is demonstrated by Maps 4–7 below, which depict the increasing total Latino population in Islip from the 1980 decennial Census through the 2013–2017 five-year ACS at the Tract level. In 1980, there was just one Tract in Islip which was over 55% Latino, and two other Tracts over 40% Latino, all in Brentwood or North Bay Shore. By the 2013–2017 ACS, every Tract in Brentwood or North Bay Shore was over 59% Latino and four Tracts were over 70% Latino.[20] Most of the Tracts in Central Islip also have high concentrations of Latinos.

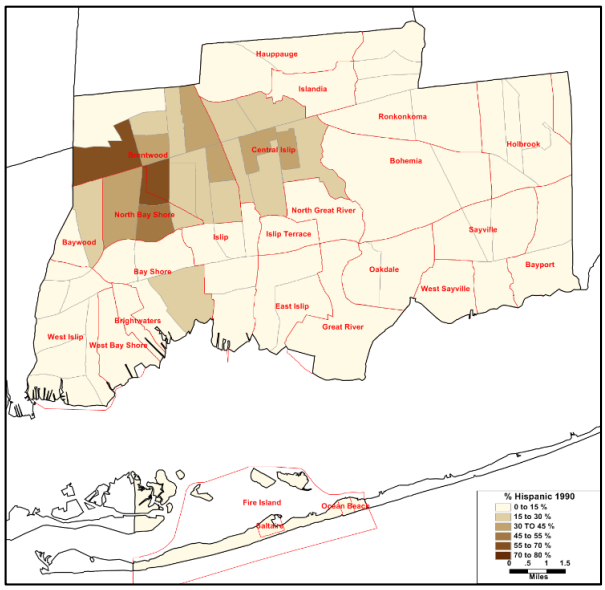
[20] The Tracts used here were the 2010 Tracts with data allocated by Census Block, so that the areas were exactly the same.

Maps 4–7. Latino Population by Census Tract over Time

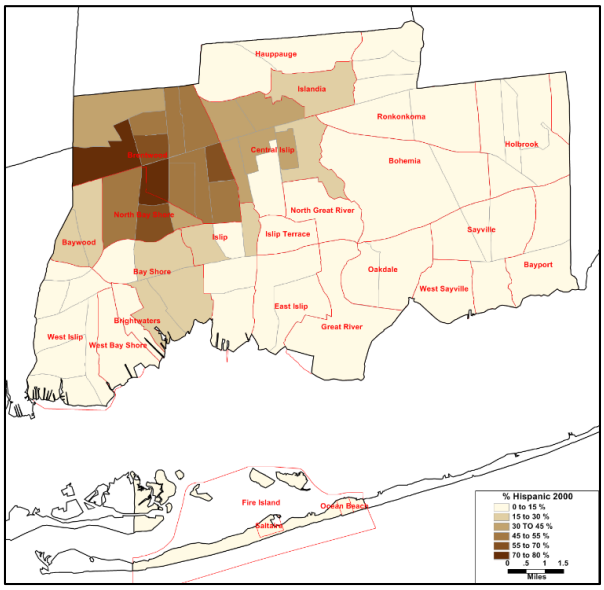
Map 4: 1980 Decennial Census



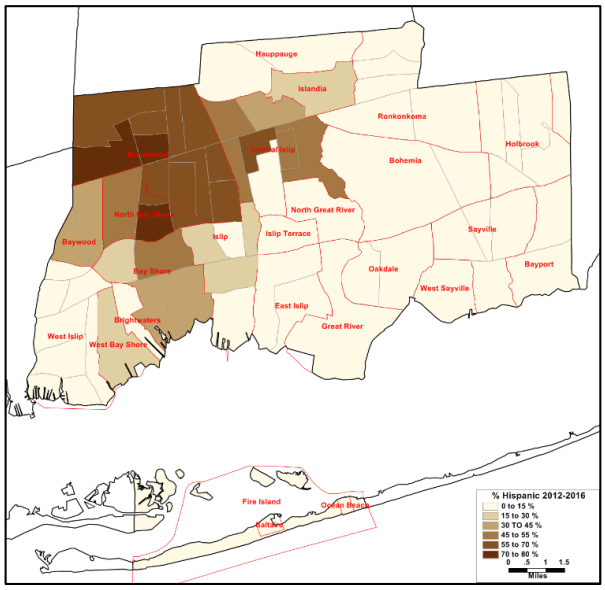
Map 5: 1990 Decennial Census



Map 6: 2000 Decennial Census



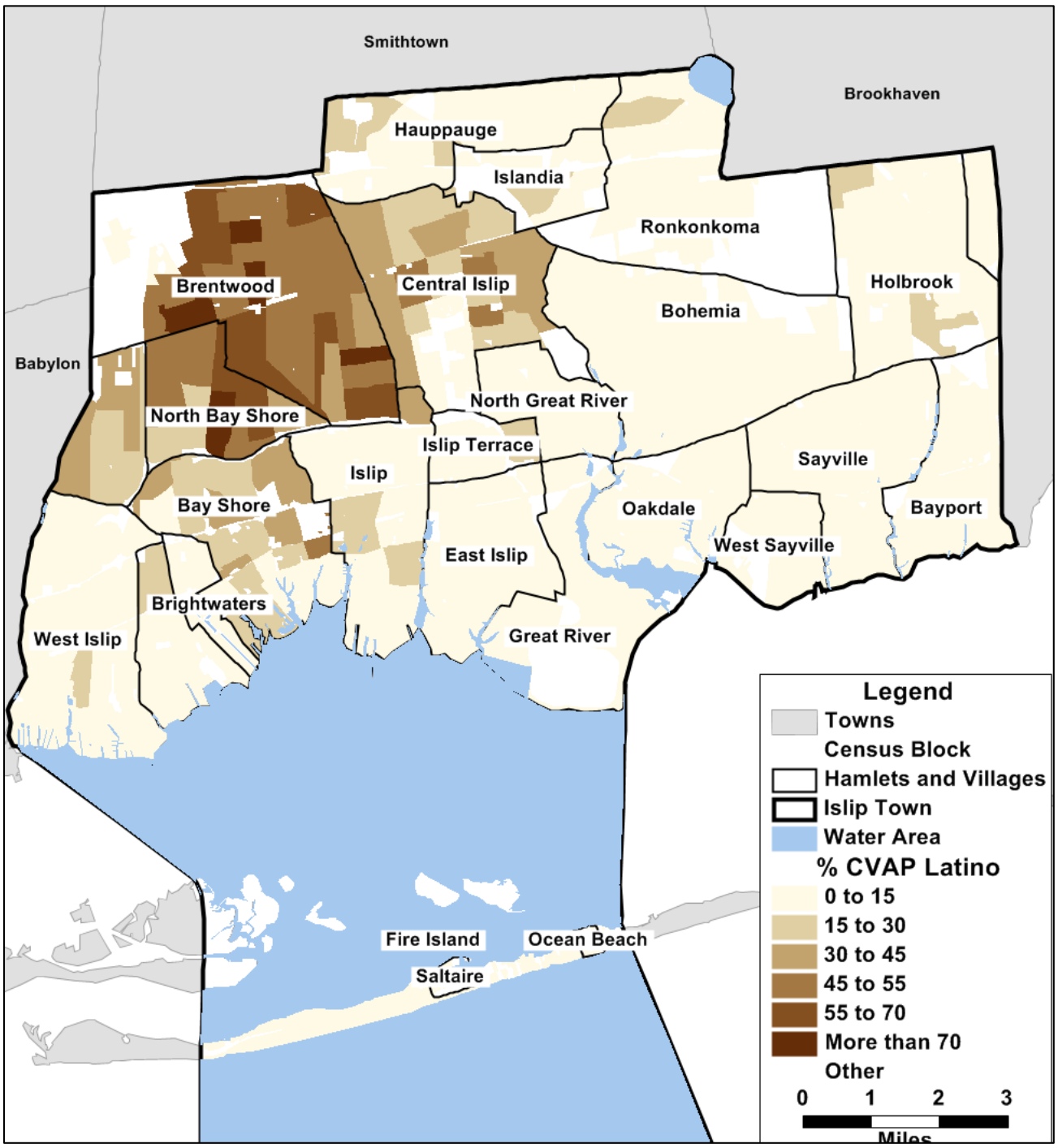
Map 7: 2016–2012 Five-Year ACS



ii. Current Geographic Distribution of Islip's Latino Population

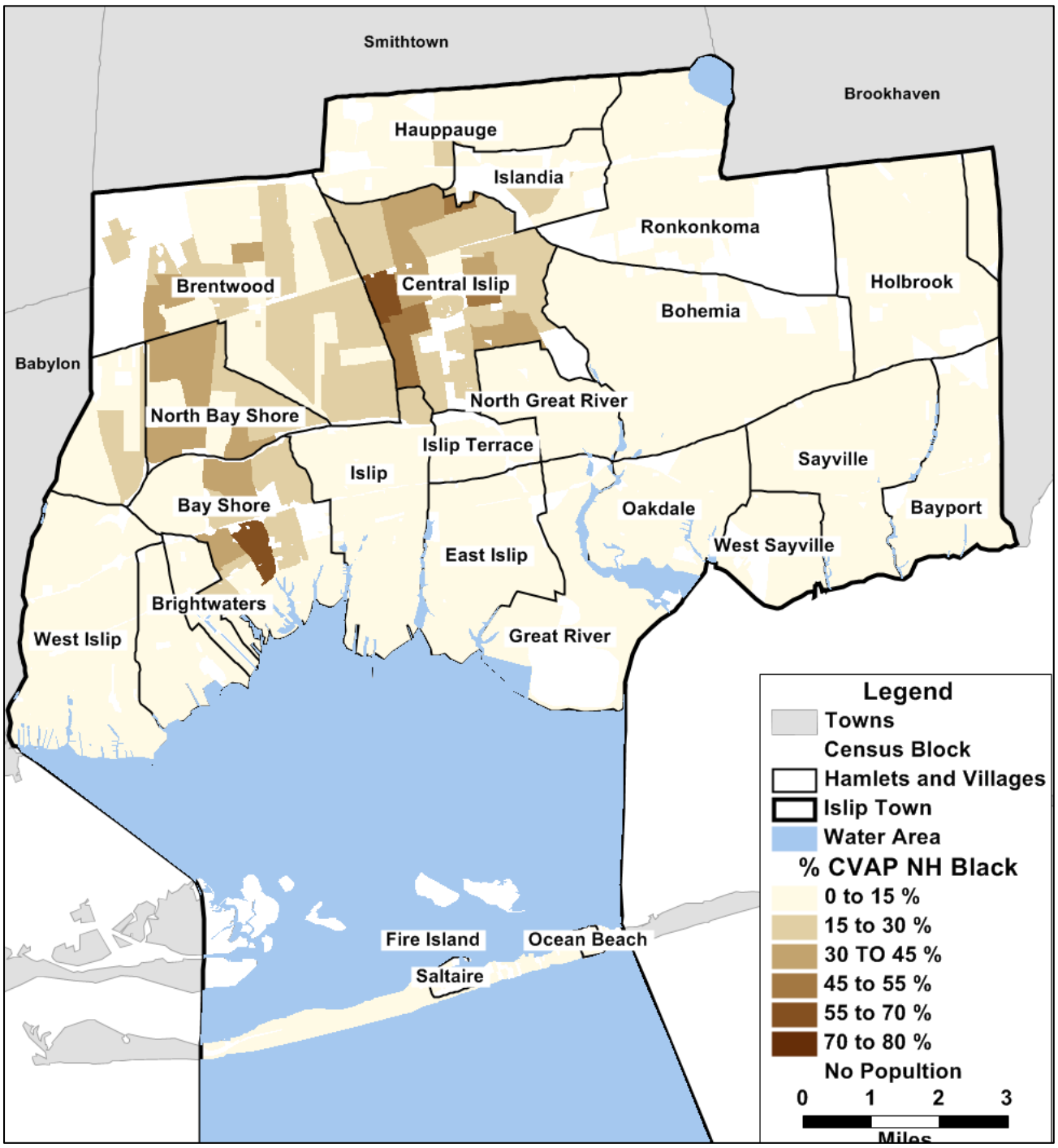
57. The map series below makes it plain that Islip's Latino population is geographically concentrated in the northwest portion of the town – particularly in Brentwood, North Bay Shore, and Central Islip. This is in stark contrast to Islip's non-Latino white population, which is distributed throughout the rest of Islip and constitutes a substantial majority in virtually all other areas. Maps 8–10 show the relative proportion of the total population by geographic area for Latinos, non-Latino African Americans, and non-Latino whites. Maps 8–10 are based on data from the 2013–2017 ACS special redistricting files.

Map 8. Concentration of Latino CVAP Population in the Town of Islip, its CDPs and Villages



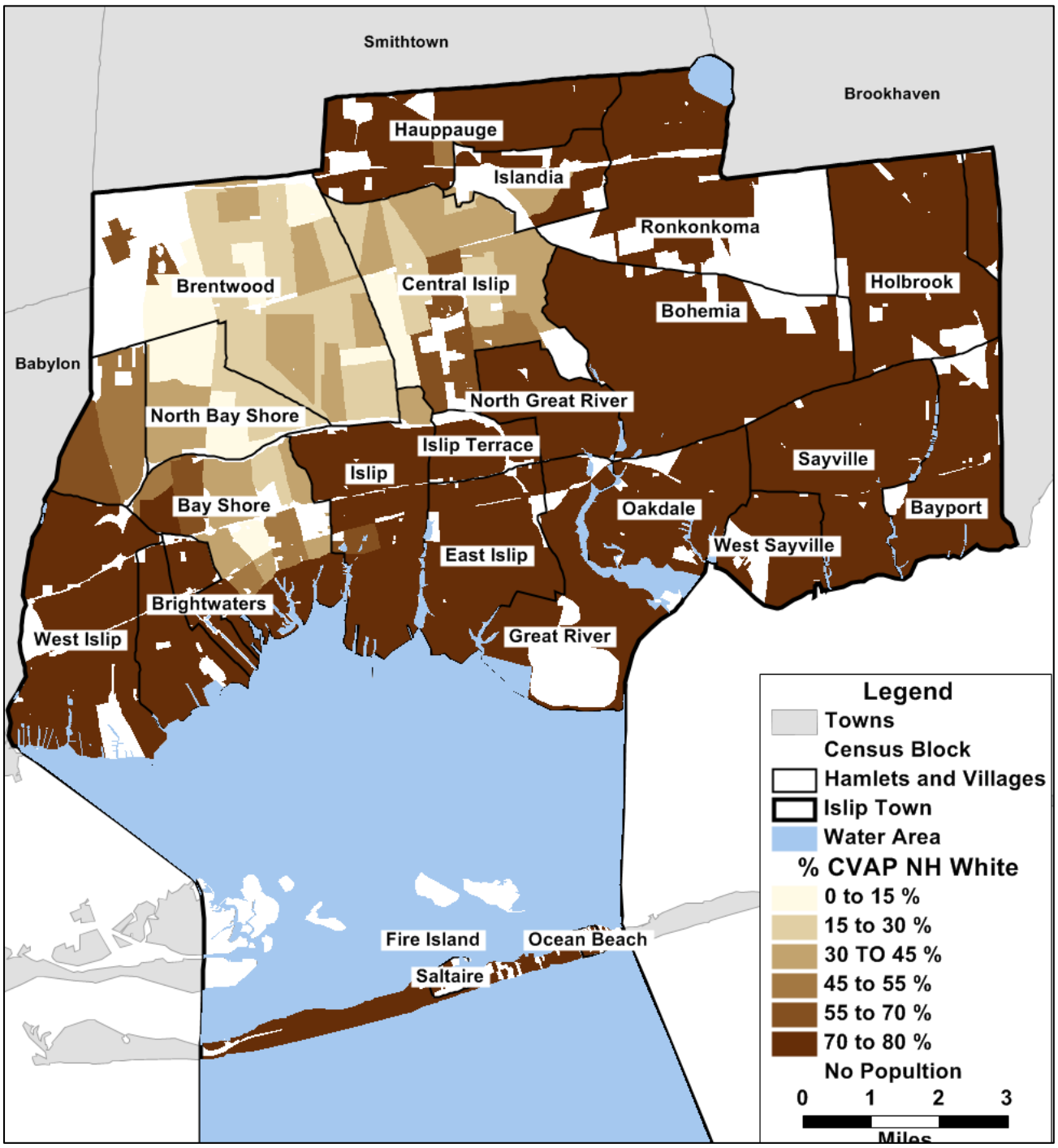
Source: Created by author from ACS 2013–2017 Redistricting Tabulation, Census Boundaries and Features.

Map 9. Concentration of Non-Latino Black CVAP Population in the Town of Islip, its CDPs and Villages.



Source: Created by author from ACS 2013–2017 Redistricting Tabulation, Census Boundaries and Features.

Map 10. Concentration of Non-Latino White CVAP Population in the Town of Islip, its CDPs and Villages.



Source: Created by author from ACS 2013–2017 Redistricting Tabulation, Census Boundaries and Features.

58. As Map 8 makes clear, the substantial Latino CVAP, VAP, and total population in Islip is geographically concentrated in and around Brentwood, North Bay Shore, and Central

Islip. According to the 2017–2013 ACS, Brentwood's total population is 63,115 (66.7% of which is Latino), and North Bay Shore's total population is 21,886 (66.3% of which is Latino). Thus, out of the 85,001 residents of Brentwood and North Bay Shore, 56,571 (or two-thirds), are Latino. Moreover, 45.6% of Central Islip's 33,253 total residents are Latino. Thus, 71,737 out of the 118,254 residents of Brentwood, North Bay Shore, and Central Islip are Latino, for a combined total of 60.7%. Notably, Brentwood and North Bay Shore alone contain more than 25% of Islip's total population, according to the 2013–2017 five-year ACS, and with Central Islip included, the three CDPs contain over 35% of Islip's total population.

59. As shown in Map 10, the relative population of non-Latino whites in these areas is very small, especially in contrast to the substantial proportions of white residents throughout the rest of Islip.

60. Furthermore, given the composition of Islip's younger Latino citizens, the general increase in Islip's Latino population, and the continued decline of Islip's total and proportional white population, I expect that Islip's Latino total population, VAP, and CVAP will continue to increase both absolutely and as a proportion of the total population, VAP, and CVAP. According to the 2017 one-year ACS, Islip's population of citizens under the age of 18 is 39% Latino and only 46.5% non-Latino white.

61. Based on historical and current settlement patterns, these increases will be mostly concentrated in the northwest area of Islip.

VII. Demonstrative Four-District Plans for the Town of Islip

62. Due to the substantial Latino CVAP in Islip that is geographically concentrated in and around Brentwood, North Bay Shore, and Central Islip, drawing a four-district plan that includes one majority Latino CVAP district follows as a natural result of applying traditional districting principles. The traditional districting principles are described below.

63. Maps 11 and 12 show two demonstrative districting plans that illustrate this possibility. First, I explain the traditional districting principles in general. Second, I explain how these traditional districting principles guided my methodology in drawing these demonstrative plans, including necessary tradeoffs between the principles. Third, I provide an analysis of each final districting plan, including quantitative measures that demonstrate compliance with the traditional districting principles. Ultimately, both plans result in one district in which the Latino CVAP constitutes a clear majority of the total CVAP in that district.

A. Traditional Districting Principles

64. Below is a description of the traditional districting principles that I applied in drawing each districting plan. I am familiar with the traditional districting principles and application of such principles based on my extensive experience in drawing districting maps, both within and outside of the judicial context. These principles are commonly applied for both initial drawing of districting plans and evaluating compliance with the Voting Rights Act for districting plans that have already been drawn.

a. ***Population equality.*** Districts within a plan should be roughly equal in population under the overarching principle of one-person one-vote. The usual rule of thumb used is that there should not be total deviation from the average population size of the district of more than 10% considering the largest and smallest districts. This is the guiding principle for all districting plans except Congressional districts, where the standard is absolute population equality.

b. ***Contiguity.*** Contiguity simply requires that the district is one unit, meaning that the entire area of the district is contained within a single, continuous border. This is an absolute standard, except in situations where islands must

be accommodated. Here, Fire Island is remote from the landmass that makes up the bulk of Islip, but must be included in the districting plan.

c. ***Compactness.*** The shape of each particular district must be reasonably compact, as observed visually based on the borders of the district. There are a series of mathematical methods developed to evaluate compactness objectively. As noted below, Maptitude for Redistricting is capable of reporting all of these measures, which either measure aspects of the shape of the district or aspects of the distribution of the population. The most well-known method is the Roeck measure, which compares the area of each district to the area of a circumscribing circle. The measure is calculated by determining the ratio between the area of the district and the area of the circumscribing circle that encircles the district. The various compactness measures are described in Exhibit 6.

d. ***Preserving existing political and geographic subdivisions.*** Both for simplicity of creating ballots and EDs, and to ensure that representation for various levels of government be related to the same area or community, it is important to preserve existing political subdivisions and other delineated geographic borders, to the extent possible. Map drawers avoid crossing boundaries of existing political and other geographic subdivisions, such as CDPs, Census Blocks, and EDs. Map drawers also endeavor to preserve traditional neighborhoods and communities of interest.

65. There often are tradeoffs among these principles, especially between population equality and compactness, and preserving political or other community subdivisions. Sometimes

one must split community or political areas in the interest of minimizing population disparities between districts, or in the interest of compactness. As noted above, Maptitude makes it easy to track district populations, view district borders and their relationship to political and other geographic boundaries, measure compactness, and maintain contiguity.

B. Demonstrative Plans, Methodology Employed, and Final Analysis

66. I was directed by counsel to prepare two demonstrative plans that each contain the entirety of the CDP of Brentwood, to the extent I could do so in a manner consistent with traditional districting principles. I was also directed by counsel to prepare one plan that preserved the boundaries between Census Blocks (the "Census Block Plan") and one plan that preserved the boundaries of EDs (the "ED Plan").[21] The two demonstrative plans are presented in Maps 11 and 12 below. As demonstrated below, a majority Latino CVAP district is possible in both maps.

67. I created and evaluated these maps using 2013–2017 ACS redistricting files.[22]

68. To create these maps, I loaded the appropriate base map into Maptitude and indicated in the Maptitude software that I intend to draw a plan with four districts. Maptitude then computes the target district population and enables the mapmaker to begin drawing district borders. For a four-district plan in Islip, the target population is 83,601[23] for each district, which is 25% of Islip's total population.

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[21] Due to the way in which Census Blocks and EDs are drawn, it is not possible to prepare a map that preserves boundaries between both Census Blocks and EDs. Islip contains 226 EDs (a small number of which do not contain any voters) compared with the 5,444 Census Blocks.

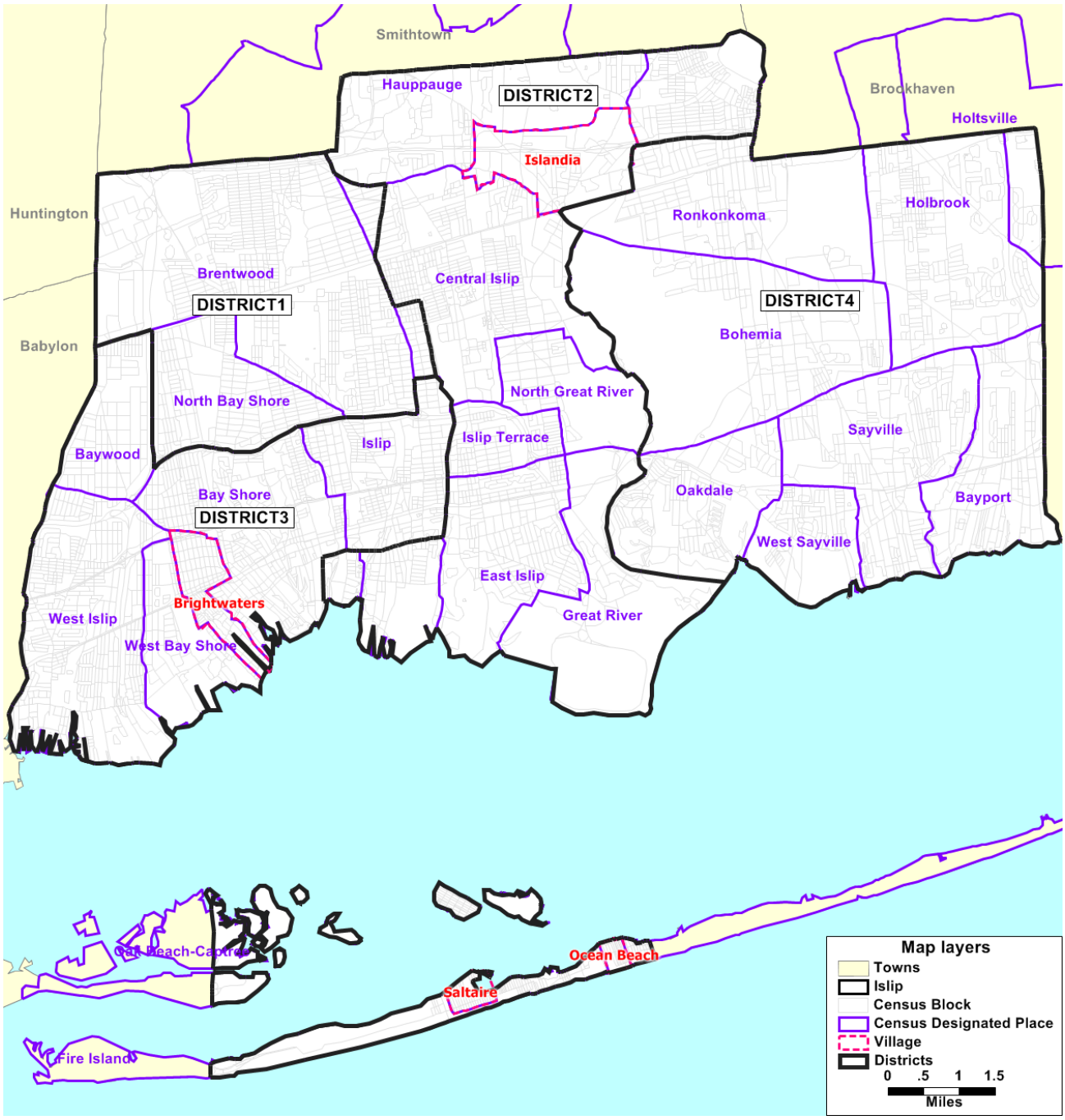
[22] I needed to calculate estimates of the 2013–2017 five-year ACS data at the Block and ED level. This was used to order to allow me to create districts that were approximately equally populated, and was also necessary to allow me to directly evaluate characteristics of the districts, such as citizenship. I did this using the methodology set forth in Appendix 1.

[23] This is based upon the 2010 Census population, which is the only population numbers available for Census Blocks.

69. In order to create district borders, Maptitude offers a districting toolbox that enables the user to assign individual Census Blocks or EDs to a district within the plan, or to make it possible to assign any available geographic area to a district. For instance, one can assign whole CDPs or Villages to a given district. This is a powerful feature in Maptitude that helps preserve boundaries or communities when drawing legislative districts.

i. Plan Based Upon Census Blocks

Map 11. Census Block Plan



Source: Created by Author using Census Boundaries and 2013–2017 ACS Redistricting File.

a. Methodology

70. I began by assigning the CDPs of Brentwood, North Bay Shore, and Central Islip to District 1. This was necessary because neither the population of Brentwood alone, nor the

population of Brentwood and North Bay Shore combined, would have been sufficient to reach the target population for one district. However, the combined populations of Brentwood, North Bay Shore, and Central Islip was much larger than the target population required for a district, so I removed some of the population from District 1 to respect the principle of population equality. From a compactness perspective, it made sense to keep Brentwood and North Bay Shore within District 1 because both are clustered in the northwest corner of Islip. Thus, I had to split Central Islip in order to bring the population of District 1 closer to the target district population. The resulting District 1 is made up of the entire CDPs of Brentwood and North Bay Shore, as well as some portions of Central Islip that are located along its shared border with Brentwood. I then proceeded to create the other three districts, being mindful of the boundaries of Villages and CDPs, and placement of major roads.

71. In preparing this plan, I was guided by adherence to the traditional districting principles. I ensured population equality between each of the districts. I ensured that each district was contiguous. I sought to draw each district in a manner intended to maximize compactness. I sought to preserve preexisting boundaries to the greatest extent possible, and I ensured that I did not split any Census Blocks. I did not use race or racial data in this process of drawing the plan.

72. Once I had completed a preliminary plan, I ran a variety of reports and integrity checks, including contiguity, the number of areas (CDPs and Villages) split, deviations from the target population, boundary cleanliness, and lastly the percentage of various population groups within each district. These reports confirm that the plan is valid.

73. Given that the geographic concentration of the Latino population in Islip is coterminous with the boundaries of several CDPs, drawing a four-district plan that includes one

majority Latino CVAP district follows as a natural result of applying traditional districting principles as described above. As is apparent from Maps 11 and 12, Brentwood and North Bay Shore sit at the core of both iterations of District 1, with slight deviations only as necessary in the interest of population equality or preservation of EDs as the primary geographic unit.

b. Analysis

74. All the major traditional districting principles were followed, as noted above. The results of this plan are summarized in Exhibits 5 and 6. For this plan, only a few CDPs needed to be split, and this was due to the requirement of population equality.

75. ***Population Equality.*** The maximum positive deviation from ideal is 0.79% and the maximum negative deviation is 0.76%, bringing the total population deviation to 1.55%. Considering that the rule of thumb regarding maximum deviations for local districting is 10%, this plan is very close to absolute equality.

76. ***Contiguity.*** All districts are contiguous, with the necessary exception of District 3, which includes Fire Island and other Island portions.

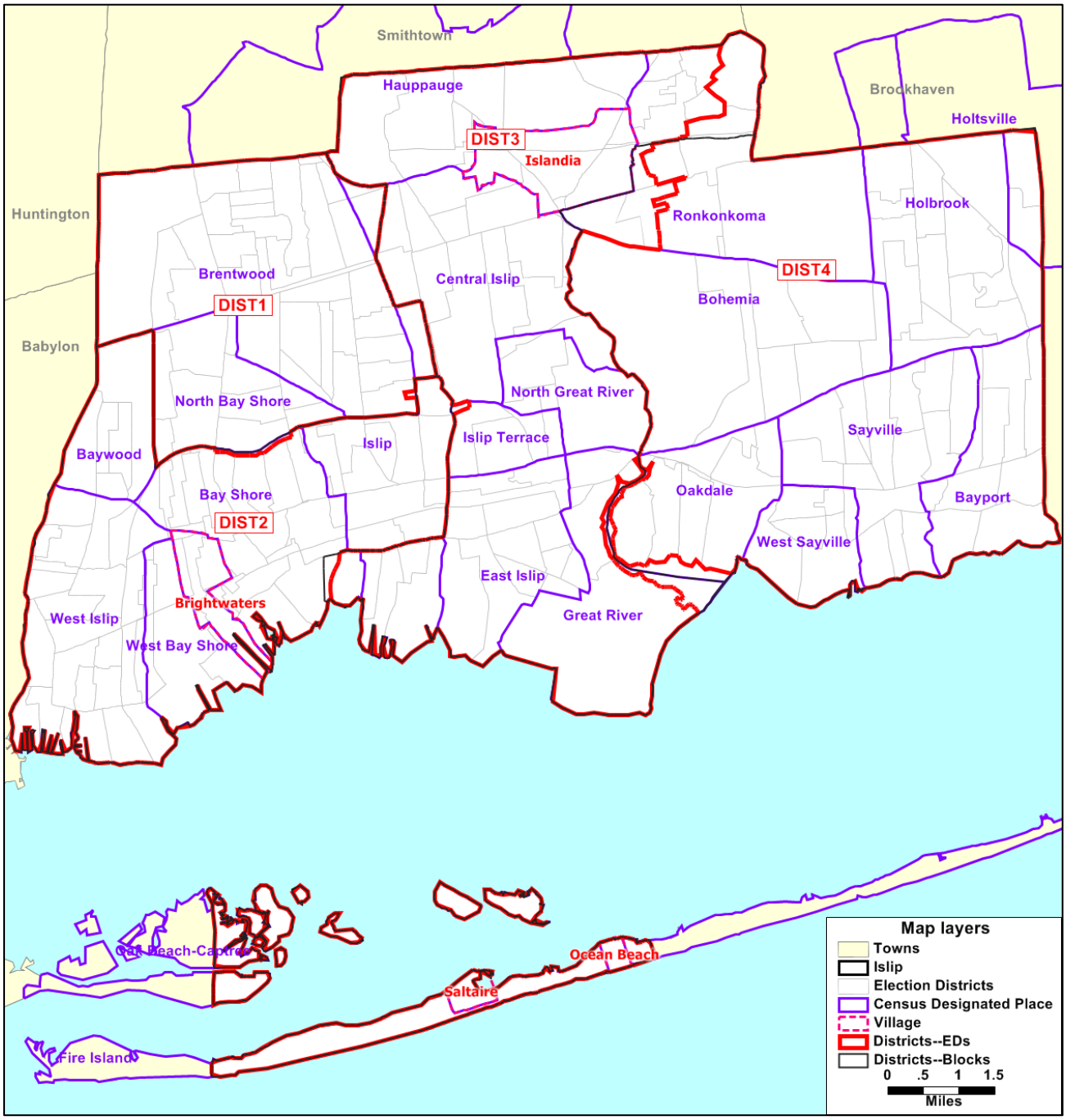
77. ***Compactness.*** Using the Roeck circumscribing circle test, District 1 scores 0.61, which is considered very compact. The only district that would be considered not particularly compact is District 3, which is due to the inclusion of Fire Island and other Island portions of Islip. More extensive measures of compactness of the demonstrative plans are available in Exhibit 6, along with explanations of each measure.

78. ***Preservation of existing political and geographic subdivisions.*** As noted, the CDP of Central Islip had to be split to preserve population equality, while the CDPs of Ronkonkoma and Islip were also split to preserve population equality. Some of the districts necessarily breached the boundaries of EDs in order to preserve Census Block boundaries.

79. Latinos constitute 54.4% of the total CVAP of District 1 in the Census Block plan.

ii. Plan Based Upon EDs

Map 12. ED Plan



Source: Created by Author using Census Boundaries and 2013–2017 ACS Redistricting File.

a. Methodology

80. I used the boundaries in the Census Block Plan as a starting point for the ED Plan. I made slight modifications to the Census Block Plan in order to unify all of the EDs, while continuing to adhere to the traditional districting principles.

b. Analysis

81. The ED Plan is generally similar to the Census Block Plan and yielded similar results.

82. ***Population Equality.*** The total population deviation in this plan is 1.01%. Like the Census Block Plan, this plan is very close to absolute equality.

83. ***Contiguity.*** All districts within the ED Plan are contiguous, with the necessary exception of District 3, which includes Fire Island and other Island portions.

84. ***Compactness.*** Using the Roeck measure, District 1 scores 0.61, which is considered very compact. Like the Census Block Plan, The only district that would be considered not particularly compact is District 3, which is due to the inclusion of Fire Island and other Island portions of Islip. More extensive measures of compactness of the demonstrative plans are available in Exhibit 6, along with explanations of each measure.

85. ***Preservation of existing political and geographic subdivisions.*** Some of the lines necessarily breached the boundaries of EDs in order to preserve Census Blocks. Otherwise, the plan exhibits the same small number of necessarily boundary splits as the Census Block Plan.

86. Latinos constitute 54.4% of the total CVAP of District 1 in the ED Plan.

C. Conclusions Regarding the Possibility of a Majority Latino CVAP District

87. Both the Census Block Plan and the ED Plan have contiguous and compact districts with only slight deviations from the target population. Each plan appropriately avoids splitting of political or other geographic subdivisions, regardless of whether Census Blocks or

EDs are prioritized. With respect to Latino composition, District 1 in both plans is above 54% Latino, based upon the CVAP derived from the 2013–2017 five-year ACS.[24]

88. As explained above, the percent of Latino CVAP has continued to increase in Islip in recent years. Therefore, the Latino CVAP percentages in District 1 in both plans – which is based on the 2013–2017 ACS data, which centers on 2015 – is a conservative estimate.

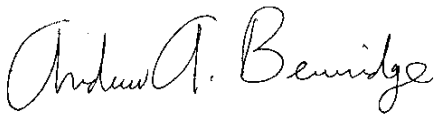
VIII. Conclusion

89. It is plain that it is possible to create a district that has a majority Latino CVAP in the Town of Islip based upon a four-district plan that complies with traditional districting principles. These demonstrative plans respect either the boundaries that have been delineated for elections districts or the Census Blocks within Islip. Both districts are quite compact using any of the standard measures. The districts of both plans are contiguous, and have minimal deviation from the ideal district population. In short, such a districting plan would afford the large, established and growing Latino CVAP of Islip an opportunity to elect a candidate of their choice, assuming they vote cohesively.

90. The foregoing statistical reporting is based upon my experience and qualifications as a social science and statistical data analyst utilizing data from the sources indicated.

[24] Data is also presented in Exhibit 5 regarding other characteristics of the Latino and racial composition of the two demonstrative plans. The ACS 2013–2017 redistricting file (released February 22, 2019) were used for the estimate of the Latino and racial group percentages. Data were allocated to the Blocks using the methodology set forth in Appendix 1, and the population data are from the 2010 decennial Census. It should be noted that there has been very little overall population change in Islip since the 2010 decennial Census, however, changing distributions of the population may also affect these results. Updates of the population at the Census Block level will not be available until March 2021, based upon the 2020 decennial Census.

Respectfully submitted,



Andrew A. Beveridge

Yonkers, New York

March 1, 2019

Appendix 1. Estimating ACS Five-Year Data at the Block Level or Election District Level

1. Five-year ACS data is available at the Block Group level, but not at the Census Block level or the election district ("ED") level. In the course of my work it became necessary to prepare estimates of certain relevant data contained in five-year ACS data sets at the Census Block level or the ED level.

2. I calculated Census Block level estimates of relevant data from five-year ACS data using a method referred to as "population based allocation." Each Block Group is comprised of a number of Census Blocks. Using population data from the most recent decennial Census, for each Block Group, I calculated the population percentage that corresponded to each Census Block. Then, I allocated relevant data from the five-year ACS for each Block Group to each of the Census Blocks within that Block Group based on the population percentage of each Census Block. This method allowed me to compute estimates of five-year ACS data at the Census Block level. Population based allocation is commonly used by scholars and has been upheld in other cases in which I and others have submitted districting plans.[25]

3. I generally calculated ED level estimates of relevant data from five-year ACS data by simply aggregating relevant data from all of the Census Blocks within each ED, which I calculated using the method described in the above paragraph. Census Blocks are much smaller than EDs: Islip contains 5,444 Blocks and 226 EDs. The vast majority of Census Blocks are contained within a single ED, making this process straightforward. However, some Census Blocks are split between multiple EDs, and in order to incorporate the data from these Census Blocks into the ED level estimates, I used a method referred to as "areal based allocation." For

[25] Logan, Xu & Stults, *Interpolating U.S. Decennial Census Tract Data from as Early as 1970 to 2010: A Longitudinal Tract Database*, The Professional Geographer, Vol. 66-3 at 412–20 (2014).

any Census Block that was split between multiple EDs, I allocated the relevant data to each ED based on the areal proportion of that Census Block that was contained within each ED. Areal based allocation is commonly used by scholars and has been upheld in other cases in which I and others have submitted districting plans.[26]

4. At the direction of counsel, I combined ED level census data with ED level election results provided by the Suffolk County Board of Elections and delivered the data to Dr. Michael D. McDonald. I used five-year ACS data that was centered around the year of the election if possible (for example, for the 2013 Islip elections, I used 2011–2015 five-year ACS data, which is centered around 2013).[27]

[26] *Id.*

[27] For elections occurring in 2015 or later, I used 2012–2016 five-year ACS data, which was the most current data available at the time I provided the data to Dr. McDonald. For elections occurring in 2004, 2005, and 2006, I used 2005–2009 five-year ACS data, which is the earliest five-year ACS data available. For all elections occurring before 2004, I used data from the applicable long-form decennial Census.

Appendix 2. Estimate of Latino Voter Registration and Vote Count using Surname Analysis

1. I was directed by counsel to prepare estimates of Latino voter registration and Latino vote count as of the November 2017 general election.

2. I received two files containing lists of all registered voters in Islip from the Suffolk County Board of Elections. One file was from July 2017 and the other was from January 2019. The files included complete Suffolk County voting histories for each voter.

3. I used both these files in order to prepare a complete file of registered voters that were eligible to vote in the November 2017 general election (the "voter file"). I did this by supplementing the July 2017 file with voters from the 2019 file, but not on the 2017 file, who registered up to 25 days before the 2017 general election.[28] The voter file also contained information indicating who had actually voted in the 2017 general election in Islip.

4. I used what is referred to as "surname analysis" to calculate estimates of the number of Latinos in the voter file and the number of Latinos that voted in the November 2017 general election. There have been various approaches to surname analysis. I used two of the most prominent and well-regarded techniques, which led to similar results.

5. The first technique for estimating the number of Latinos was set forth by the Census Bureau (the "Census Bureau Surname Method").[29] The Census Bureau provides a list of 639 surnames that are frequently reported as Latino. This list includes many, but not all, Latino surnames, therefore the Census Bureau paper suggests that the number of "hits" on those names should be multiplied by a factor of between 1 and 1.5 in order to arrive at an estimate of the

[28] New York requires voters to register to vote at least 25 days before an election in order to be eligible to vote in that election.

[29] Word & Perkins, *Building a Spanish Surname List for the 1990's— A New Approach to an Old Problem*, Working Paper No.13, Population Division, U.S. Census Bureau (Mar. 1996).

number of Latinos within a given population. The Census Bureau Surname Method is a reliable and generally accepted method for measuring the approximate number of Latinos within a given population.

6. The second technique for estimating the number of Latinos in a population was set forth by Bernard Grofman and Jennifer Garcia (the "Grofman/Garcia Surname Method").[30] Like the Census Bureau Surname Method, the Grofman/Garcia Surname Method uses a Latino surname list but does not set a specific number of surnames to use. The Grofman/Garcia Surname Method relies on the fact that there will be both Type 1 and Type 2 error in surname matching, *i.e.*, some surnames will mistakenly identify a non-Latino as a Latino, and any surname list will necessarily miss a certain number of Latinos. The proper number of Latino surnames to use for matching is the number that will result in the same rates of Type 1 and Type 2 error. In other words, it will incorrectly classify the same number of non-Latinos as Latinos as it incorrectly classifies Latinos as non-Latinos. The proper number of surnames is determined using a recursive Bayesian technique.

7. I used both techniques to calculate estimates of the number of Latinos in the voter file that were eligible to vote in the 2017 general election and the number of Latinos who actually voted in that election. The results of these analyses are shown in Tables 1 and 2 of this Appendix.

8. At the direction of counsel, I delivered the town-wide data contained in Tables 1 and 2 to Dr. Michael D. McDonald and I delivered the town-wide and PUMA data contained in Tables 1 and 2 to Dr. John Logan.

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[30] Grofman & Garcia, *Using Spanish Surname to Estimate Hispanic Voting Population in Voting Rights Litigation: A Model of Context Effects Using Bayes' Theorem*, Election Law Journal, Vol. 13-3 at 375–93 (2014).

Table 1. Estimates of Latino Registered Voters in Islip, November 2017

Geographic Area	Total Registration	Census Bureau Surname Method		Grofman/Garcia Surname Method
		No multiplier	1.5x multiplier	
All of Islip	215,626	24,719	37,079	30,183
PUMA: 3603309	81,708	3,076	4,614	3,756
PUMA: 3603310	63,493	17,827	26,740	21,768
PUMA: 3603311	70,426	3,816	5,725	4,660

Table 2. Estimates of Latino Voters in the 2017 General Election in Islip

Geographic Area	Total Vote Count	Census Bureau Surname Method		Grofman/Garcia Surname Method
		No multiplier	1.5x multiplier	
All of Islip	62,632	3,722	5,584	4,516
PUMA: 3603309	28,251	770	1,155	934
PUMA: 3603310	11,802	2,288	3,431	2,776
PUMA: 3603311	22,579	665	997	807

Appendix 3. List of Material Relied Upon

1. Census data from the 1980, 1990, 2000, and 2010 decennial Census, including both the complete count and long-form sample. These data are public and widely available. They were originally produced by the U.S. Census Bureau, and are available either online or in CD or DVD form from the Bureau, as well as from many depository libraries. See census.gov for more information.

2. Data from the five-year and one-year ACS files from 2006 through 2017. These data are public and are available for download from the Census Bureau through its American Factfinder System, as well as in other forms.

3. Special ACS redistricting files that include date arrayed in a very useful way that include citizenship and racial and ethnic classification at a variety of geographic levels, most particularly at the Block Group and Tract level. *See* census.gov/rdo.

4. A variety of Census Boundary files from 1980, 1990, 2000, 2010, including other material regarding Islip. These are also available for download from the Census Bureau.

5. Earlier boundaries files created by Minnesota Population Center through their Historical Geographic Information System project, which is funded by the National Science Foundation and the National Institutes of Health. These boundary files are on common base.

6. Election district files created by the GIS Office of Suffolk County, which delineate election district boundaries.

7. Files of election results from the Board of Elections of Suffolk County.

8. Microsoft Excel.

9. SAS, a well-known software program used to run statistical analyses, and organize data.

10. Maptitude for Redistricting the leading GIS software used for redistricting. It includes Census Boundaries and a variety of tools to assist in the drawing and analysis of legislative districts.

11. National Academy of Sciences, Committee on National Statistics, *Benefits, Burdens, and Prospects of the American Community Survey: Summary of a Workshop* (2013).

12. Logan, Xu & Stults, *Interpolating U.S. Decennial Census Tract Data from as Early as 1970 to 2010: A Longitudinal Tract Database*, The Professional Geographer, Vol. 66-3 at 412–20 (2014).

13. Word & Perkins, *Building a Spanish Surname List for the 1990's— A New Approach to an Old Problem*, Working Paper No.13, Population Division, U.S. Census Bureau (Mar. 1996).

14. Grofman & Garcia, *Using Spanish Surname to Estimate Hispanic Voting Population in Voting Rights Litigation: A Model of Context Effects Using Bayes' Theorem*, Election Law Journal, Vol. 13-3 at 375–93 (2014).